American National Can.

LABORATORY REQUEST
NEENAH TECHNICAL CENTER

Restricted Distribution
(First & Last Name-Location Code)

Master File
Specifications
\Library
BOL [illegible]

Tammy Fisher

Requested by and Location: J Zhang / NTC	Request Date: [redacted]
End Use Application: Shrink Bag	Plant Location Code: 240
Project Number: LR-200	Plant Order Number: —
Spec # or E# or ES#: E-15409-93	Customer: —
Process: Saran	Competitor (CA only): —

Objective

Dow CGCT polymer Evaluation

Sample Identification and Structures

V1 Control 80/10/10 in sealing layer for 3 layer bag
V2 Dow CGCT 2A37 in " "
V3 90/10 2A37/97.06 in " "
V4 80/20 " / " in " "
V5 80/10/10 97.06/318.96/2A37 in " "
V6 70/20/10 97.06/2A37/38.92 in " "

Data Requested (Test Method and Conditions)

* puncture 6mm probe 1"/min rate, in to out.
Optics: → Haze, Gloss, Clarity,
* MST @ 40psi, 1 sec. dwell
* Seal Strength (seal at ~~220°F~~ 225°F, ~~235°F~~ 240°F, 250°F and 265°F
Shrink Free at 200 and 180°F
Impact, probe toward sealant.
Thickness / layer Ratio

ANALYTICAL LAB USE ONLY

Assigned to	Notebook Reference	Completion Date	Report Number
Pat Griedl	RD5465 p. 143-147 and p. 150-152.	[redacted]	9029-3

FORM 4573 3/91

puncture, Ination, 6 m.m. probe, in to out, lbs.

	1.	2.	3.	4.	5.	6.
	7.9	11.6	12.3	13.6	8.6	8.6
	8.3	12.2	13.8	13.0	9.1	9.4
	8.8	11.0	13.6	12.0	8.5	8.5
	8.3	11.0	12.9	11.3	9.5	9.5
	7.8	12.3	13.9	12.4	9.4	8.4
	8.2	11.1	13.9	12.8	8.8	8.4
	8.2	11.5	13.4	12.5	9.0	8.8

Seal curve, sealant to sealant, Ination, 90° angle of separation, supported tail, sealed at various temperatures, 40 psig, 1 sec. dwell, lbs/1" width.

	1.	2. ⊛	3. ⊛	4. ⊛	5.	6.
225°F.	2.7	Below MST.	below MST.	Below MST.	3.3	
	2.2				2.5	Below MST.
	2.4	—	—	—	4.0	—
	3.5	—	—	—	2.9	—
	2.3	—	—	—	1.7	—
	2.6	X	X	X	2.9	X
240°F.	4.50	3.0	3.10	3.0	4.65	4.50
	3.25	3.2	2.95	3.4	5.05	3.65
	4.90	1.2	3.20	3.9	5.30	4.70
	3.90	3.0	3.20	3.2	5.15	4.70
	2.60	4.6	—	4.3	5.15	4.70
	3.8	3.0	3.1	3.6	5.1	4.4
250°F.	4.60	2.60	5.40	4.25	5.4	4.95
	5.05	2.45	5.70	4.65	5.5	4.65
	4.80	2.70	3.95	3.50	5.0	4.60
	5.10	3.25	4.10	5.40	4.8	4.60
	4.45	2.90	3.20	4.30	5.1	5.30
	4.8	2.8	4.5	4.4	5.2	4.8
265°F.	4.85	2.40	3.85	5.20	4.85	5.00
	5.10	2.75	4.00	4.50	4.40	4.90
	4.95 W.	2.70	4.40	4.85	4.80 W.	4.95 W.
	5.50	2.70	3.75	4.70	4.80	4.70
	4.55	3.25	4.00	4.55	4.40	4.80
	5.0	2.8	4.0	4.8	4.6	4.9

⊛ Variable 2, 3 + 4 were extremely curly around the sealant side which made it very difficult to produce the 1" wide seals.

W = Weld type seal; Peeled from film tear-off at the seal.

9029.3.

minimum Seal Temperature, Sentinel Sealer, 40 psig, 1 sec. dwell, minimum temperature required to produce a good seal, °F.

1. 225
2. 240
3. 240
4. 240
5. 225
6. 230

Haze, %.

1.	2.	3.	4.	5.	6.
7.31	5.35	6.75	4.88	5.90	5.71
7.19	5.66	8.80	5.91	5.51	5.70
6.87	5.65	7.71	7.54	4.63	4.87
7.88	5.75	6.99	6.03	5.62	4.95
6.85	6.07	6.19	6.18	5.80	6.62
6.46	5.85	7.32	5.86	5.70	5.91
7.1	5.7	7.3	6.1	5.5	5.6

Gloss, 45° angle, outside, surface.

1.	2.	3.	4.	5.	6.
66.7	74.8	66.5	75.5	73.6	73.3
64.5	75.9	66.7	68.9	76.2	72.5
67.0	72.6	65.0	73.4	76.9	74.5
64.2	75.5	73.8	74.3	73.6	73.5
70.0	78.6	75.0	73.9	73.1	68.4
69.2	78.2	70.3	73.1	74.4	72.6
66.9	75.9	69.5	73.2	74.6	72.4

Clarity, %.

1.	2.	3.	4.	5.	6.
54.4	54.8	19.0	44.4	57.8	57.6
55.6	39.2	48.6	44.0	48.4	45.6
61.6	47.8	46.4	48.8	46.2	66.0
52.4	6.4	57.0	64.6	53.4	65.0
57.4	50.2	44.2	52.4	48.0	56.8
63.2	55.0	17.0	44.8	60.4	63.0
57.4	42.2	38.7	49.8	52.4	59.0

Thickness, TMI, mils.

1.	2.	3.	4.	5.	6.
2.06	2.23	2.63	2.48	2.37	2.25
2.05	1.96	2.61	2.60	2.22	2.11
2.34	2.08	2.65	2.21	2.23	2.05
2.16	2.47	2.54	2.42	2.11	2.07
2.03	2.36	2.70	2.41	2.17	2.26
2.10	2.45	2.77	2.41	2.29	2.19
2.12	2.26	2.65	2.42	2.23	2.15

9029-3.

Temperature, °F.	Sample	Specimen	Thickness, mils	% Shrink M.D.	% Shrink C.M.D.
180°F.	1	1	1.99	10	28
		2	2.01	13	29
		3	2.10	12	27
	2	1	2.00	16	31
		2	2.12	16	30
		3	2.35	16	31
	3	1	2.31	18	26
		2	2.40	18	28
		3	2.40	19	27
	4	1	2.06	19	29
		2	2.19	19	28
		3	2.24	20	28
	5	1	2.12	11	25
		2	2.21	13	26
		3	2.34	12	25
	6	1	2.02	13	26
		2	2.17	12	26
		3	2.20	12	25

9C29-3.

Temperature, °F.	Sample	Specimen	Thickness, mils	Shrinkage, % Shrink M.D.	Shrinkage, % Shrink C.M.D.
200°F.	1	1	1.96	35	53
		2	1.98	33	54
		3	2.18	36	54
	2	1	1.98	31	54
		2	2.28	29	52
		3	2.37	32	52
	3	1	2.23	40	53
		2	2.32	37	52
		3	2.42	37	53
	4	1	2.02	38	51
		2	2.14	38	52
		3	2.33	38	52
	5	1	2.07	33	52
		2	2.13	35	53
		3	2.30	34	52
	6	1	2.09	34	52
		2	2.11	34	52
		3	2.18	37	55

E. A. I. T System

DISK FILE = STATISTICS DATA [redacted] 09:55:18
OPERATOR = PLG
MATERIAL ID = V-1
SAMPLE ID = V1
LOAD CELL = 500-3933
TUP RADIUS = 0.750 in
DART WEIGHT = 35.00 lbs
COMMENT = ZHENG
RUN COMMENT = Probe toward sealant (in). TEMPERATURE = 73 °F

TEST	@PEAK LOAD D	L	E	PEAK --> ZERO D	E	TOTAL D	E
9029-3.S01	1.240	39.7	2.33	0.185	0.39	1.425	2.73
9029-3.S02	1.425	39.7	2.94	0.100	0.17	1.525	3.11
9029-3.S03	1.105	39.0	2.03	0.490	0.92	1.595	2.95
9029-3.S04	1.420	38.8	2.75	0.130	0.37	1.550	3.13
9029-3.S05	1.190	36.4	2.11	0.310	0.91	1.500	3.02
9029-3.S06	1.415	41.4	2.94	0.350	1.13	1.765	4.06
AVG	1.299	39.2	2.52	0.261	0.65	1.560	3.17
STD DEV	0.139	1.6	0.41	0.15	0.38	0.12	0.46
COEF VAR	10.72	4.1	16.31	57.28	59.02	7.39	14.61

E. A. I. T System

DISK FILE = STATISTICS DATA 02-23-1993 10:08:12
OPERATOR = PLG
MATERIAL ID = V-2
SAMPLE ID = V2
LOAD CELL = 500-3933
TUP RADIUS = 0.750 in
DART WEIGHT = 35.00 lbs
COMMENT = ZHENG
RUN COMMENT = Probe toward sealant (in). TEMPERATURE = 73 °F

TEST	@PEAK LOAD D	L	E	PEAK --> ZERO D	E	TOTAL D	E
9029-3.S01	1.840	70.5	5.93	0.035	0.13	1.875	6.06
9029-3.S02	1.710	59.8	5.13	0.035	0.09	1.745	5.22
9029-3.S03	2.150	66.7	6.67	0.035	0.14	2.185	6.82
9029-3.S04	2.160	66.9	6.46	0.015	0.04	2.175	6.50
9029-3.S05	0.005	213.3	0.09	0.140	2.40	0.145	2.49
9029-3.S06	2.170	71.2	7.13	0.015	0.03	2.185	7.16
AVG	1.673	91.4	5.23	0.046	0.47	1.718	5.71
STD DEV	0.839	59.8	2.61	0.05	0.94	0.79	1.71
COEF VAR	50.19	65.4	49.90	102.90	199.45	46.15	30.04

E. A. I. T System

DISK FILE = STATISTICS DATA 02-23-1993 10:24:09
OPERATOR = PLG
MATERIAL ID = V-3
SAMPLE ID = V3
LOAD CELL = 500-3933
TUP RADIUS = 0.750 in
DART WEIGHT = 35.00 lbs
COMMENT = ZHENG
RUN COMMENT = Probe toward sealant (in). TEMPERATURE = 73 °F

TEST	@PEAK LOAD D	L	E	PEAK --> ZERO D	E	TOTAL D	E
9029-3.S01	2.395	93.7	9.94	0.030	0.12	2.425	10.06
9029-3.S02	2.315	85.4	9.39	0.035	0.17	2.350	9.56
9029-3.S03	2.320	85.6	8.59	0.050	0.24	2.370	8.83
9029-3.S04	2.305	84.9	8.97	0.025	0.09	2.330	9.06
9029-3.S05	1.885	81.6	6.90	0.040	0.17	1.925	7.07
9029-3.S06	2.170	91.1	8.98	0.030	0.11	2.200	9.09
AVG	2.232	87.0	8.79	0.035	0.15	2.267	8.95
STD DEV	0.185	4.4	1.03	0.01	0.06	0.18	1.02
COEF VAR	8.28	5.1	11.77	25.56	36.07	8.08	11.38

[redacted] System

DISK FILE = STATISTICS DATA
OPERATOR = PLG
MATERIAL ID = V-4
SAMPLE ID = V4

COMMENT = ZHENG
RUN COMMENT = Probe toward sealant (in.)

[redacted] 10:34:5

LOAD CELL = 500-393
TUP RADIUS = 0.750
DART WEIGHT = 35.00
TEMPERATURE = 73

TEST	@PEAK LOAD D	L	E	PEAK --> ZERO D	E	TOTAL D	E
9029-3.S01	2.175	79.2	8.14	0.040	0.19	2.215	8.33
9029-3.S02	2.325	78.5	8.47	0.035	0.14	2.360	8.61
9029-3.S03	2.045	74.7	7.16	0.025	0.11	2.070	7.27
9029-3.S04	2.195	80.6	7.96	0.045	0.25	2.240	8.21
9029-3.S05	1.690	64.6	4.98	0.040	0.10	1.730	5.08
9029-3.S06	2.230	78.8	8.04	0.040	0.16	2.270	8.20
AVG	2.110	76.1	7.46	0.037	0.16	2.148	7.62
STD DEV	0.225	5.9	1.29	0.01	0.06	0.23	1.32
COEF VAR	10.65	7.8	17.27	18.38	36.35	10.49	17.36

E.A.I.T System

DISK FILE = STATISTICS DATA
OPERATOR = PLG
MATERIAL ID = V-5
SAMPLE ID = V5

COMMENT = ZHENG
RUN COMMENT = Probe toward sealant (in).

02-23-1993 10:44:32

LOAD CELL = 500-3933
TUP RADIUS = 0.750 in
DART WEIGHT = 35.00 lbs
TEMPERATURE = 73 °F

TEST	@PEAK LOAD D	L	E	PEAK --> ZERO D	E	TOTAL D	E
9029-3.S01	1.740	44.5	4.14	0.055	0.16	1.795	4.29
9029-3.S02	1.270	52.0	2.92	0.150	0.49	1.420	3.41
9029-3.S03	1.445	48.2	3.35	0.045	0.11	1.490	3.47
9029-3.S04	1.615	45.6	3.71	0.100	0.29	1.715	4.00
9029-3.S05	1.655	46.8	3.92	0.045	0.11	1.700	4.03
9029-3.S06	1.395	43.5	2.90	0.105	0.24	1.500	3.14
AVG	1.520	46.8	3.49	0.083	0.23	1.603	3.72
STD DEV	0.179	3.0	0.52	0.04	0.14	0.15	0.45
COEF VAR	11.75	6.5	14.83	50.72	62.06	9.49	12.00

E.A.I.T System

DISK FILE = STATISTICS DATA
OPERATOR = PLG
MATERIAL ID = V-6
SAMPLE ID = V6

COMMENT = ZHENG
RUN COMMENT = Probe toward sealant (in).

02-23-1993 10:51:12

LOAD CELL = 500-3933
TUP RADIUS = 0.750 in
DART WEIGHT = 35.00 lbs
TEMPERATURE = 73 °F

TEST	@PEAK LOAD D	L	E	PEAK --> ZERO D	E	TOTAL D	E
9029-3.S01	1.410	42.6	2.98	0.365	1.23	1.775	4.21
9029-3.S02	1.535	41.6	3.26	0.350	1.15	1.885	4.41
9029-3.S03	1.500	45.6	3.65	0.255	0.91	1.755	4.56
9029-3.S04	1.610	48.5	3.87	0.035	0.07	1.645	3.95
9029-3.S05	1.460	47.3	3.41	0.085	0.26	1.545	3.66
9029-3.S06	1.635	44.5	3.83	0.100	0.32	1.735	4.15
AVG	1.525	45.0	3.50	0.198	0.66	1.723	4.16
STD DEV	0.087	2.6	0.35	0.14	0.50	0.12	0.32
COEF VAR	5.68	5.9	9.97	72.43	76.11	6.76	7.69

9029-3.

Layer Thickness, microscope, mil.

	out	core	in	total
1.	.52	.38	1.18	2.08
	.61	.36	1.09	2.06
	.60	.38	1.28	2.26
	.47	.42	1.21	2.10
	.51	.47	1.07	2.05
Average	.54	.40	1.17	2.11
2.	.94	.43	.86	2.23
	.73	.31	.95	1.99
	.74	.40	.89	2.03
	.64	.53	1.01	2.18
	.65	.59	.88	2.12
	.79	.57	.97	2.33
Average	.75	.47	.93	2.15
3.	.90	.47	1.08	2.45
	.78	.44	1.02	2.24
	.73	.46	1.26	2.45
	.61	.47	1.25	2.33
	.59	.58	1.24	2.41
	.73	.55	1.18	2.46
Average	.72	.49	1.17	2.38
4.	.72	.49	1.05	2.26
	.58	.51	1.25	2.34
	.62	.43	1.22	2.27
	.68	.45	1.29	2.42
	.66	.42	1.07	2.15
	.76	.38	1.03	2.17
Average	.67	.45	1.15	2.27

9029-3.

	cut	core	in	total
5.	.70	.33	1.35	2.38
	.61	.30	1.20	2.11
	.55	.40	1.18	2.13
	.72	.42	1.28	2.42
	.47	.45	1.08	200
	.59	.43	1.16	2.18
Average	.61	.39	1.21	2.21
6.	.63	.43	1.12	2.18
	.52	.46	1.16	2.14
	.45	.35	1.27	2.07
	.60	.35	1.21	2.16
	.62	.45	1.17	2.24
	.65	.44	1.24	2.33
Average	.58	.41	1.19	2.18